called the "progressive" principle—that is, at a number of different speeds from the maximum speed attainable down to four or five knots per hour—are of the greatest value to future designs of ships and machinery. For a long time they have been made occasionally in the Admiralty practice; but Mr. W. Denny deserves great credit for bringing the system into general use and establishing its practical value. Associating progressive trials with the "law of comparison" for the resistances of ships of different dimensions but similar forms, a designer can feel great confidence of success in most of his practice. If he has the *data* for small ships propelled at relatively high speeds, he has the means of approximating closely to the performances of larger ships up to much higher speeds, and this is of enormous value under present conditions.

Methods of *propulsion* and details of *propellers* occupy a large section of the volume under review. The paddle-wheel, the screw, and the water-jet propeller all receive full discussion in their theoretical and practical aspects. Probably no such summary of facts relating to modern practice has been made before by any writer. Under paddle-wheels, for example, there are descriptions constituting practical data for designing paddles at the *sides* of steamers (the ordinary plan), at the *stern*, as in light-draught river-steamers, and at the *centre*, between twin hulls, as is the fashion in some American river-steamers. Under the jet-propeller appears a great mass of information as to the fittings and performances of a number of vessels, including the English gunboat *Waterwitch* and Thornycroft's torpedo-boat of recent construction, the German *Hydromotor*, described in NATURE, vol. xxvi. pp. 18 and 247, and a Swedish experimental boat. Naturally the greatest attention is bestowed upon screw-propellers, which are most generally employed. To the theory of the screw-propeller laid down by Rankine, many valuable additions have been made by the Froudes, father and son, Mr. R. Froude being still engaged in the investigation of the subject experimentally. Up to the present, however, it cannot be said that any complete, acceptable theory has been put forward. Experience shows that by the choice of proper screws enormous economies of power or sensible increases in speed may be secured. The first trials of H.M.S. *Iris*, nearly ten years ago, were fortunately most disappointing, for they compelled a close study of the screw question in her case, with the result that the speed was increased from 16½ to 18½ knots per hour simply by a change of screws. Similarly striking results have been obtained in ships and boats of the torpedo flotilla, and in vessels of the mercantile marine. Much yet remains to be done before a satisfactory practice can be insured in choosing a suitable propeller for a ship of novel type or exceptional speed. Probably here also experiment with models of screws will come in to assist full-scale operations. Attempts in that direction have been made for many years past in the Admiralty Experimental Works, but the task is one of great delicacy and difficulty, and is far from having been completed.

Mr. Busley goes over this ground very carefully, and gives practical rules, based on experience for the most part, for fixing the sizes and pitch of screws. One of the best of these is that published by Mr. S. Barnaby and based on the extensive experiments of the Messrs. Thornycroft, whose success in the construction of exceptionally swift vessels results in part from the close attention given by them to screw-propellers. Mr. Busley has an interesting chapter on the geometry of screw-propellers; and his remarks on the most suitable materials for propellers are important.

The illustrations to this volume are numerous and well executed. The letterpress and general style of production leave nothing to be desired. It may be anticipated that the work now completed will speedily become a standard book of reference for German marine engineers.

W. H. W.

AN ARCTIC PROVINCE

An Arctic Province: Alaska and the Seal Islands. By Henry W. Elliott. Illustrated by many Drawings from Nature, and Maps. (London: Sampson Low and Co. 1886.)

MANY accounts of Alaska and of the wonderful seal-rookeries to be met with on some of the islands in its Arctic seas have been published, but none which have given in so interesting and succinct a manner the history of these far-off northern solitudes as the present volume. The author's personal knowledge of these regions, and his intimate acquaintance with the very numerous writings of others on the subject, have enabled him to write a volume that will long remain a standard one; while the illustrations from his own pencil are full of life and vigour, and add immensely to the value of the work.

The volume contains, of course, an account of the discovery, in 1741, of the Alaskan Province by Veit Bering, and of his shipwreck and sad death. The survivors spread the news of the wealth of fur and ivory that was to be found there, and soon came the rush of Russian traders. Fierce struggles took place between the individual traders and the natives, and much blood was shed, but at last a Russian American Company was established with supreme powers; and for a time, under the supervision of that very remarkable man, Governor Alexander Baranov, it flourished. Its decadence, however, proved to be as rapid as its rise; and after various vicissitudes, lasting during the first half of the present century, the district was, in 1867, acquired by the United States Government by negotiation from Russia. The name of Bering was given to the Straits connecting the Pacific with the Arctic Ocean by our Capt. Cook.

The features of the Sitkan region are treated of in a special chapter. Were it not for the damp and extensive rainfall, the climate would be endurable. A great deal of the scenery is most picturesque. The aboriginal life of the Sitkans is glanced at, but this portion of the work contains nothing very new or profound, as the author does not profess to know as much about the natural history of the human race as about that of the marine mammalia. In separate chapters, the alpine zone of Mount St. Elias, Cook's Inlet and its people, and the great Island of Kodiak, are treated of. The quest of the otter has a whole chapter devoted to it. Few ladies realise how many men are engaged in deeds of hazardous peril

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to obtain for them the ebony sea-otter trimming to their dainty sealskin sacques. These otters would seem to be on the eve of extirpation, so ruthlessly are they hunted and destroyed. All the world's supply comes from the North Pacific and Bering Sea. The chase and capture of the otter furnish the only employment possible for several thousands of the semi-civilised natives of Alaska, so that the destruction of this trade would be very disastrous to the hunters.

The chapter on the great Aleutian Chain tells us of the volcanic island of Oonimak, the cone-shaped crater of Shishaldin, and Oonalashka Island, with its smoking volcano of Makooshin. The chief interest of the volume centres, however, in the chapters relating to the wonderful Seal Islands, and on the modes of capture of the seals, and on their habits. The Pribylov Islands of Bering Sea were discovered just a century ago by Pribylov, the commander of a Russian sloop. He called them Subov Islands, but the Russians seem unanimously to have elected to call them after their discoverer. Sketch-maps of St. Paul and St. George are given, and there are very full and minute details of each, and of the few neighbouring rocky islets, including Walrus Island, which would appear to teem during the summer season with bird life. The history of the progress made from the earliest to the present times by the various villages on these islands is also given, and the writer alludes to the fact that the natives may be expected in the end to adopt the English rather than the Russian tongue.

The longest chapter in the volume is that devoted to the history of the habits and manners of the fur seal, which in myriads frequents these islands, and this chapter will well deserve perusal. From the economic point of view the author seems satisfied that, should the laws and regulations made by the United States Government be acted on in the future as they are now, 100,000 male seals under the age of five years and above the age of one year may be safely taken each year without the slightest injury to the regular birth-rate, or the natural increase thereof. Calculating the pups at 1,000,000 a year, of this number half are males. Of these, say one-half are lost during their first year of infancy. Owing to the polygamous habits of the males and the great age to which the adult males live, not one-fifteenth of this number is ever needed on the rookeries, and on this showing it is better that they should be killed to supply the fur trade with their skins, than that they should be allowed to live to consume millions of cod and wolf-fish.

The sea-lion (*Eumetopias stelleri*) is also a characteristic pinniped of these islands, but, having no fur, is for its naked skin valuable only to the natives. Mr. Elliott gives a graphic account of the habits of these enormous beasts, the adult males of which will measure 10 to 11 feet in length, with a girth of 8 to 9 feet around the chest and shoulders.

In the chapter on "Innuit Life and Land" a good deal of information is given as to an immense northern area, where the dwelling-houses are approached by underground passages, and where moose and reindeer abound. Still more northern wilds are described in a chapter on "Lonely Northern Wastes," while one on "Walrus and Walrus-hunting" concludes the volume. These morse are perhaps of all animals the most difficult subjects that an artist can find to reproduce from life. There are no angles or elbows to seize hold of; the outlines of the body and limbs are all rounded, free, and flowing. Some life studies of the young made by artists no doubt are good; but, until the appearance of Mr. Elliott's drawings of the fully mature animal, we had nothing in the way of portraits much better than caricatures of these strange beasts.

One interesting fact is mentioned in connection with Norton's Sound: on its shores are many low clayey bluffs, which, as they are annually undermined by the surf and chiselled by frost, fall in heavy masses on the beach, thereby exposing deposits of the bones and tusks which apparently belong to the mammoth. From time immemorial the Innuits have used this ivory for tipping their spears, lances, and arrows.

The illustrations, as we have before said, form a very prominent feature in this volume, which we commend to the reader's notice as both interesting and pleasant reading.

ANTIQUITIES OF SPAIN AND PORTUGAL

Les Ages préhistoriques de l'Espagne et du Portugal. Par M. Émile Cartailhac. Imperial 8vo, with 450 cuts and 4 plates. (Paris: Reinwald, 1886.)

ANTHROPOLOGISTS and archæologists will gladly hail this handsome volume from the pen of the editor of the "Matériaux pour l'Histoire primitive de l'Homme." It relates to two countries of the primæval antiquities of which but little is generally known, and the literature concerning whose early relics has hitherto been but scanty. It is true that we have various essays on the prehistoric antiquities of Portugal by Carlos Ribeiro, Delgado, and the Geological Commission; while those of Spain have been treated of by Signor Tubino and Dr. Vilanova y Piera, and, so far as Andalusia is concerned, by Signor Gongora y Martinez; and, as to some of the caves, by Mr. MacPherson and the late Mr. Busk. The work, however, of M. Cartailhac is far more general and comprehensive than that of any previous author. It will be well perhaps to give some sort of summary of the contents of his book.

After some preliminary considerations, he attacks the subject of the quartzite and flint flakes, which have been considered by some to prove the existence of man in Portugal in Tertiary times, but after a fair examination of the facts, not only in Portugal but in France, he regards the proofs as not sufficiently convincing, and remarks that unexceptionable traces of Tertiary man remain still to be discovered. Probably not a few of those who visited the plain of Otta on the occasion of the Prehistoric Congress at Lisbon in 1880 will agree in this verdict of M. Cartailhac.

The existence of Quaternary man in Spain has evidence in its favour of a far more satisfactory character. Sections of the remarkable valley-gravel deposits of the Manzanares at San Isidro, near Madrid, are given, as well as cuts of some of the implements there found, which, so far as form and material are concerned, might have come from the valley of the Somme. Some other implements of the same class have also been found in Portugal. Instruments both in flint and bone similar to

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